PATENT
NASA LEW: 17,484-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re:	Patent Application of Mark McDowell	:	Group Art Unit:
Serial No.:		:	Examiner:
Filed:	Herewith	:	
For:	Compact Microscope Imaging System With Intelligent Controls	:	

Sent to Addressee using Express Mailing Label No. EL 238528645 US **on this** 21 **day of** August, **2003.**
Kent N. Stone

INFORMATION DISCLOSURE STATEMENT

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

Pursuant to 37 C.F.R. 1.56 and in accordance with 37 C.F.R. 1.97-1.98 submitted herewith is a copy of each of the following four (4) U.S. Publications of U.S. Patent Applications and twelve (12) U.S. Patents, along with a completed form PTO/SB/08A.

U.S. PUBLICATION NUMBERS

2001/0052979
2002/0024007
2002/0097394
2003/0048931

U.S. PATENTS

4,202,037	6,243,189
5,606,168	6,266,182
5,646,776	6,285,498
5,731,708	6,356,088
5,892,539	6,404,906
6,198,573	6,441,958

U.S. Publication No. 2001/0052979 ('0052979) deals with a spectroscopic imaging system, which is traditionally used for microscopes to allow simultaneous imaging and spectroscopy. The output and analysis from this apparatus is a waveform or spectral analysis. Unlike '0052979, the present invention does not use a spectroscopic system. More particularly, the system of the present invention consists of a miniature CCD Camera attached to a microscope objective. The output of the present system is based on the actual properties of the cell sample, not the frequency readings of the contrast patterns used for spectroscopic analysis systems.

U.S. Publication No. 2002/0024007 ('0024007) deals with the use of a confocal scanning microscope using a laser, scanning device and a micro mirror. The system of '0024007 consists of a collection of hardware when pieced together gives the user the ability to conduct scanning microscopy experiments. There is nothing similar between the system of '0024007 and the techniques of the present invention, which do not rely on a confocal scanning microscope, laser, scanning device or micro mirror. The system of the present invention comprises a 3-axis programmable accelerator connected to a computer that enables automated image scanning and detection, a miniature video camera

connected to a microscope objective used for observing very small samples, and a computer used for image acquisition, sample analysis and auto-focusing.

U.S. Publication No. 2002/0097394A1 ('0097394) deals with the visual inspection of a substrate utilizing a conventional microscope looking at a sample in multiple directions. The goal of the '0097394 is to create an inspection system with favorable ergonomic properties and a compact design, but requiring human intervention. The technique employed by the present invention is automatic and requires no human intervention nor does it limit it to the use of a conventional microscope.

U.S. Publication No. 2003/0048931 ('0048931) deals specifically with analyzing tissue samples used for the field of pathology. The automated method is for a large database to form an opinion on a tissue sample based on a study of sets of pooled samples, which require aprioi knowledge about the subject at hand. The disclosure of the '0048931 document specifically uses liver tissue as a prime example of its method. The main goal is automated pathological studies of tissue samples. The difficulty with this technique is that it is limited to tissue samples only. The system of the present invention is not limited to aprioi knowledge about a perspective sample. The technique of the present invention only uses a known standard and computes the following metrics for each cell found in a sample: x, y position, major axes length, minor axes length, area of the cell, elongation of the cell, roundness of the cell, the angle of orientation, thinness and whether or not the cell is only partially in the field of view. These statistics are not given for the tissue samples used in the '0048931 document. However, using these statistics is

crucial in identifying and classifying defects in cells, which is one of the main focuses of the technology of the present invention. The present invention provides automation, which involves automatically locating a cell in a field of view, auto focusing on that cell and then analyzing its metrics to make an informed decision about the cell.

U.S. Patent 4,202,037 ('037) deals with older generation microscope systems well before the personal computer was an integral part of image analysis. The techniques of the '037 patent are devoid of attaching a microscope system to a computer with an image analysis system such as related to the present invention.

U.S. Patent 5,606,168 ('168) deals with the use of a scanning electron microscope based on laser-base setup and used for in situ tensile testing. It is primarily used for Materials Science testing. The practice of the present invention provides a system using standard video cameras. The technology of the '168 patent and that of the present invention not requiring a laser-base setup do not overlap.

U.S. Patent 5,646,776 ('776) details a compact specimen inspection system with the samples oriented vertically to facilitate its compactness. The '776 patent uses an X-Y stage to move the sample for analysis. The system of the present invention can analyze a sample orientated horizontally or vertically for our analysis. The system of the present invention also uses an X-Y-Z stage that adds the feature of auto-focusing. Unlike the '776 patent, the system of the present invention does not need a human operator to perform its desired tasks.

U.S. Patent 5,731,708 ('708) deals with a specific hardware/apparatus used for analyzing semiconductors for the semiconductor industry. The apparatus is a conventional microscope set on a platform utilizing an X-Y stage (two dimensions). Unlike the '708 patent, the present invention utilizes an X-Y-Z stage (three dimensions) that is used for auto-focus and auto-imaging scanning, but is not restricted to the semiconductor industry. The system of the present invention can be used for any type of sample viewable with a microscope probe and is not limited to the two dimensional positioning of the '708 patent.

U.S. Patent 5,892,549 ('539) details the use of a portable emission microscope system combined with a cooled CCD camera cooperating with microscope optics for the detection of photon emissions related to integrated circuits. The teaching of the '539 patent involves elevating temperatures in the system in order to detect the photon discharge from the circuit board to determine any failures. The '539 patent only details photon emission analysis for the field of integrated circuits. Unlike the '539 patent, the present invention provides the use of a microscope system used for the Cell Identification and Classification for Biomedical Applications, an Auto-Focus Technique for Compact Microscope Systems and the Interface Detection of Colloidal Hard Spheres Systems.

U.S. Patent 6,198,573 B1 ('573) discusses the use of a compact microscope configured as a closed housing where the specimen is drawn in using an opening with all optical components being housed in this opening. The microscope of the '573 patent can also be mounted in a standard hard disk drive bay of a computer and are controlled by a

computer. The specimen can be moved in two mutually perpendicular directions. There are distinct differences with the '573 patent and the present invention. One such difference is in the ability to auto-focus on the specimen, which the present invention accomplishes by incorporating an X-Y-Z stage to gather intelligence. Another distinct difference is that there is no mention in the '573 patent of how the specimens are analyzed, whereas the present invention clearly describes concrete examples of the analysis techniques of microscopy samples.

U.S. Patent 6,243,189 B1 ('189) discusses an inexpensive and compact optical relay for use with scanning beam imaging systems. The '189 patent relies on the use of scanning mirrors used in conjunction with microscope objectives and also consists of two eyepieces forming a focal assembly. The system of the present invention is devoid of scanning mirrors nor does it use the microscope system described in the '189 patent.

U.S. Patent 6,266,182 B1 ('182) deals with a specific piece of hardware called an operating microscope. More particularly, the '182 patent incorporates an endoscopic image into an operating-microscope image to allow simultaneous observation. Unlike the '182 patent, the present invention does not use an operating microscope. More particularly, the system of the present invention is not limited to one type of microscope system and can be used using any type of microscope system. Further, unlike the '182 patent, the present invention provides an automated image processing system and is free of human intervention that burdens the '182 patent.

U.S. Patent 6,285,498 B1 ('498) deals with a specific hardware device that is aided by a computer for automated specimen imaging and analysis. The '498 patent primarily deals with the configuration of optical microscopes and microscope-based electronic imaging systems. Unlike the '498 patent, the present invention uses a video microscope, which is essentially a probe with a monocular instead of a binocular view to analyze a sample. Further, unlike the '498 patent, the present invention provides specific techniques and applications for a compact microscope imaging system with intelligent controls that are not disclosed nor suggested by the '498 patent.

U.S. Patent 6,356,088 B1 ('088) deals with a compact laser-scanning microscope with an integrated short-pulse laser. It is geared towards multiphoton microscopy and uses a plurality of wavelengths as the output. The hardware of the '088 patent specifically deals with a laser-based setup and multi-photon microscopy. It also provides a description of an apparatus used for microscopy experiments, not an actual analysis technique. Unlike the '088 patent, the system of the present invention does not use a laser-based system, which has safety concerns and has limited use in the general field of microscopy. Further, unlike the '088 patent the present invention provides analysis techniques for Adaptive Thresholding, Auto-Focus, Auto-Imaging Scanning, Cell Identification and Classification and Motion Detection of cells.

U.S. Patent 6,404,906 B2 ('906) deals with the use of a computer-controlled conventional microscope analyzing images from several contiguous fields of view to show a relationship of biological material in a specimen. The technique of the '906

patent further utilizes the use of computers to allow tele-science of a microscope experiment and the ability for multiple users to access the microscope system simultaneously. The '906 patent deals with a hardware/software solution for acquiring images and analyzing digital images for the analysis of plant or biological specimens. However, unlike the present invention, the '906 patent does not mention a specific technique or analysis example. Unlike the '906 patent, the system of the present invention is capable of identifying any type of sample that can be imaged. The present invention uses a computer to control a translation stage as well as providing intelligence into this system by implementing an auto-focusing and auto-imaging scanning techniques for samples. Further, once the present invention identifies a sample, it provides specific analysis techniques that require no human intervention.

U.S. Patent 6,441,958 B1 ('958) describes a conventional compact microscope with a CCD detector for viewing samples on a fixed stage. The '958 patent generally relates to connecting a CCD camera to the eyepiece to transmit digital images to a computer or monitor. Unlike the '958 patent, the system of the present invention utilizes a compact CCD camera attached to a microscope objective. More particularly, unlike the '958 patent, the present invention utilizes a compact microscope imaging system for the Cell Identification and Classification for Biomedical Applications, an Auto-Focus Technique for Compact Microscope Systems, and a technique for Interface Detection of Colloidal Hard Spheres Systems.

The Examiner is respectfully requested to review the above-identified U.S. Publication Numbers and U.S. Patents and make them of record in the instant application as required by MPEP §609.

The U.S. Publication Numbers and U.S. Patents listed in the Information Disclosure Statement submitted as of this date, comprise the most pertinent prior art known to the applicant and his attorneys as of the date hereof. This Information Disclosure Statement should not be construed, as a representation that the art disclosed is material or that no better art exists.

Respectfully submitted,
MARK MCDOWELL

Kent N. Stone, Esquire
Attorney for Applicants
Registration No.: 31,883
NASA Glenn Research Ctr.
21000 Brookpark Rd.
MS 500/118
Cleveland, OH 44135-3191

Telephone: (216) 433-8855
Facsimile: (216) 433-6790

PTO/SB/08A (10-01)
Approved for use through 10/31/2002. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet | | of | |

Complete if Known	
Application Number	
Filing Dat	
First Named Inventor	MARK J. MCDOWELL
Art Unit	
Examiner Name	
Attorney Docket Number	NASA LEW 17, 484-1

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number: Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 2001/0052979	12/20/01	P.T. TREANO ET AL	
		US- 2002/0024007	2/28/02	J. ENGELHARDT ETAL	
		US- 2002/0097394	7/25/02	K. URBAN	
		US- 2003/0048931	3/13/03	P. JOHANSEN ET AL	
		US- 4,202,037	5/6/80	E.M. GLASER ET AL	
		US- 5,606,168	2/25/97	R. CHIRON ET AL	
		US- 5,646,776	7/8/97	P.E. BACCHI ET AL	
		US- 5,892,539	4/6/99	J.B. COLVIN	
		US- 6,198,573	3/6/01	H-G KAPITZA	
		US- 6,243,189	6/5/01	A.C. RIBES ET AL	
		US- 6,266,182	7/24/01	K. MORITA	
		US- 6,285,498	9/4/01	W.J. MAYER	
		US- 5,731,708	3/24/98	M. SOBHANI	
		US- 6,356,088	3/12/02	U. SIMON ET AL	
		US- 6,404,906	6/11/02	J.V. BACUS ET AL	
		US- 6,441,958	8/27/02	C.S. R. YOUNG ET AL	
		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] -Number[4]- Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

Burden Hour Statement: This form is estimated to take 2.0 hours to complete. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

Sent to Addressee using Express Mailing Label No. ER 238528645 US on this 21 day of August, 2003.

Kent N. Stone